Lack of Relationship between Cardiovascular Disease Risk Factors and Regional Measures of MRI, PiB-PET, and Tau-PET in Knight ADRC Participants

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Background

- Biomarkers of amyloid-β (Aβ), tau-containing neurofibrillary tangles, and neurodegeneration characterize Alzheimer disease (AD) under the ATN framework[1-2].
- Cardiovascular disease risk factors (CVD-RFs) such as hypertension, body mass index, and smoking status can elevate the risk for AD dementia, but their direct influence on AD pathology is largely unknown[3].
- We investigated the relationship between CVD-RFs and AD biomarkers in older adults from the Charles F. and Joanne Knight Alzheimer Disease Research Center (Knight ADRC).

Table 1. Demographics

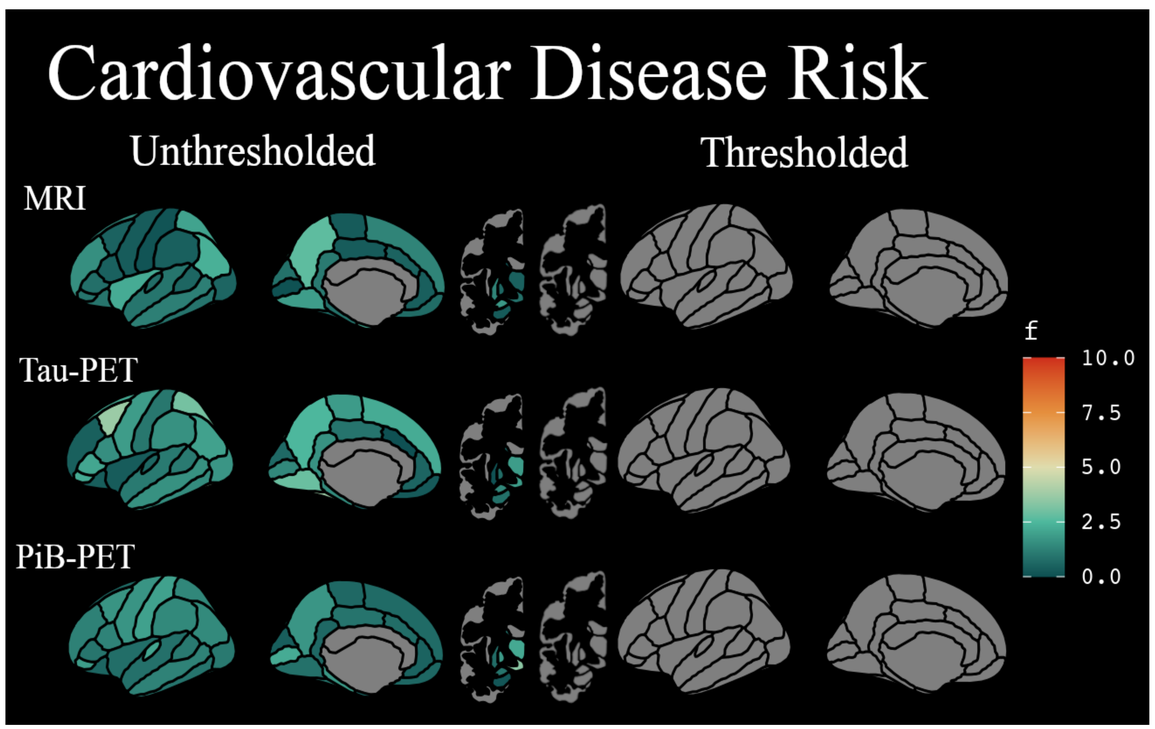
Characteristic	MRI and Tau-PET N = 138[1]	PiB-PET N = 355[1]
Age (yrs)	66.25(6.62)	64.20(7.33)
Sex		
Female	70(51%)	212(60%)
Male	68(49%)	143(40%)
Body Mass Index (kg/m^2)	28.80(6.24)	28.40(6.10)
Systolic Blood Pressure	128.22(14.58)	127.11(15.78)
Current Smoking Status		
Non-Smoker	132(96%)	333(94%)
Smoker	6(4.3%)	22(6.2%)
Education (yrs)	16.78(2.08)	16.31(2.53)
Mini Mental State Examination	29.42(0.83)	29.40(0.83)
APOE E-4 Status		
Non-Carrier	81(59%)	234(66%)
Carrier	57(41%)	121(34%)
Centiloid	14.88(20.47)	6.72(20.75)
Cardiovascular Risk		
<5%	9(6.5%)	37(10%)
5-10%	24(17%)	95(27%)
10-20%	83(60%)	174(49%)
>20%	22(16%)	49(14%)

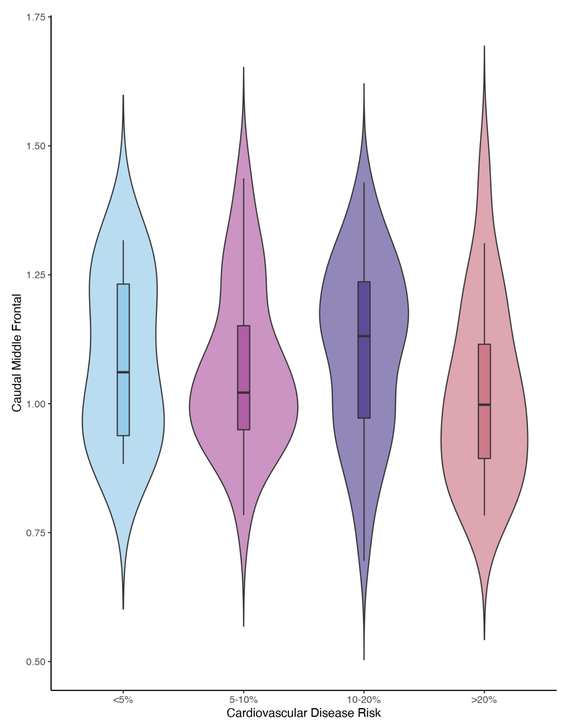
[1] Mean(SD); n(%)

Methods

- Magnetic resonance imaging (MRI) data: Volume in FreeSurfer-derived regions of interest (ROIs).
- Positron emission tomography (PET) data: PiB-PET and tau-PET standard uptake value ratios (SUVRs) in FreeSurfer-derived ROIs.
- World Health Organization CVD: Age, sex, BMI, hypertension, & smoking status.
- Linear Models for MRI and Tau-PET:
  ROIs ~ Age + Sex + APOE ε4 + Followup_Time + Centiloid + CVD + Centiloid*CVD
  PET SUVRs ~ Age + Sex + APOE ε4 + Followup_Time + Centiloid + CVD + Centiloid*CVD
- Linear Models for PiB-PET:
  PET SUVRs ~ Age + Sex + APOE ε4 + CVD
- Multiple comparisons corrected using a Benjamini-Hochberg procedure with false discovery rate of 5%.

Results





Conclusions

- CVD-RFs are not associated with AD biomarkers in a cross-sectional late life cohort.
- Across all levels, CVD-RFs were not predictive of regional brain volume, Aβ-, or tau-PET uptake.
- More sensitive measures of CVD-RFs may be necessary to identify whether lifestyle factors impact pathology in late life.
- Further, establishing links between CVD and AD risk may have greater effectiveness in midlife populations.

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